Workplace organization, and comparative economic development

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14024-GEM

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Fiscal equalization, capitalization and the flypaper effect

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Trust, Workplace Organization, and Comparative Economic Development

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[#] Acknowledgements: The author wishes to thank Mariko Klasing for invaluable feedback. Helpful comments from seminar participants at the University of Groningen and the Hanse Institute for Advanced Study, as well as from participants at the 2013 Netherlands Economists Day and the 2013 ZEW workshop on the Impact of Human Resource Management are also gratefully acknowledged.

Trust, Workplace Organization, and Comparative Economic Development

Abstract

I propose and test a bottom-up channel through which trust between parties to an exchange can go on to affect comparative economic development of societies as a whole. My approach revolves around the autonomy that employers (principals) grant to workers (agents), which is a key feature of workplace organization. Analyses using measures of the cultural component of trust confirm my hypothesis that higher social trust leads countries to specialize in industries characterized by high levels of work autonomy in their production processes. My key contribution is to integrate the microeconomic literature on workplace organization with the macroeconomic literature on trust. (*JEL* D23, F14, L23, M54, O43, O57, P50)

Keywords: Social capital, work autonomy, industry specialization, comparative advantage, division of labor, organizational design, culture

Trust, the reliance on another person to act in the interest of the trustor even when that person can cheat the trustor without punishment, forms the basis of cooperation and is linked to uncertainty reduction and lower transaction costs in economic exchange (Arrow 1972; Coleman 1990; Fukuyama 1995; Gambetta 1988). As an informal enforcement mechanism, trust allows markets to function and extend beyond the level of kinship-based communities, in turn sustaining a more fine-grained division of labor and increased specialization (Fukuyama 1995; Gintis et al. 2005). The macro-level implications of trust—promoting economic development and fostering other beneficial societal outcomes—are thus well understood (Algan and Cahuc 2010; Knack and Keefer 1997; Putnam 1993; Uslaner 2002; see Algan and Cahuc 2013 for an overview).[1] Moreover, the basic logic underlying these positive effects of trust—running through enforcement, transaction costs, and the division of labor—is also clear.

However, extant research has narrowly focused on relationships between macro-level variables and does not consider how exactly trust between two or more parties to an exchange can go on to affect the performance of societies as a whole. While lower transaction costs and uncertainty reduction are intuitively appealing promoters of economic exchange at the micro level, there is no research that establishes an explicit connection between the micro level at which trust

[1] Research into the economic consequences of trust has spawned a broader literature investigating the role of informal institutions, notably culture, in economic development (Gorodnichenko and Roland 2011; Guiso et al. 2006; see Nunn 2012 for survey).

operates and trust's economic consequences at the macro level. This paper seeks to contribute to the literature on the role of culture and informal institutions in comparative economic development by forging such a micro-macro connection. Specifically, I propose and test a bottom-up channel for the macroeconomic consequences of trust that is rooted in the way firms go about organizing and managing their operations (i.e., their production processes). To do so, I integrate two important developing research areas, one at the micro level and one at the macro level.

First, a growing literature considers workplace organization or organizational design to account for firm-level differences in performance and productivity (Bloom et al. 2014 and Syverson 2011 review the literature). I expand on earlier work to consider work autonomy as a key feature of workplace organization, rather than more narrow and concrete human resource management practices.[2] Second, researchers have started to use cross-country cross-industry analyses to study domestic institutions as determinants of comparative advantage, especially of industry export flows (see Nunn and Trefler 2013 for a survey). Earlier work in this area focused on the role of formal institutions, notably legal contract enforcement (Levchenko 2007; Nunn 2007). I follow-up with an analysis of the

[2] Bloom and Van Reenen (2007), for example, study what firms actually do when it comes to hiring and firing or promoting people, among others. My focus on work autonomy matches most closely with Bloom et al. (2012) who find that trust affects the extent to which a multinational firm decentralizes and gives authority to local managers.

impact of informal institutions, considering social trust as a central domestic institution.[3]

Following the standard approach in the literature (Nunn 2007; Rajan and Zingales 1998; Romalis 2004), an essential feature of my analysis is the benchmarking of industries, for which I characterize the organization of work in a particular industry by the level of autonomy granted to employees in this industry. Trust operates at the micro level where it governs interactions between economic actors. Hence, by considering the level of work autonomy that a principal grants to an agent I am able to construct an industry measure that embodies micro-level evidence on a vital form of exchange between two parties. Many papers in the literature on domestic institutions and comparative advantage benchmark industries based on industries' intermediate inputs. The present paper, in contrast, employs individual-level data, thus obtaining an industry benchmark that gives a most detailed and direct reflection of what goes on in firms within specific industries and how people in an industry interact to add value to intermediate inputs. Moreover, an important difference with past work is that I use Balassa's (1965) index of revealed comparative advantage to study patterns of industry specialization instead of simple export flows. In fact, because specialization affects economic development partly because industries differ in their potential

[3] Rauch (1999), among others, considers social networks as informal institutions affecting trade flows. Tabellini (2008) examines the effect of trust on industry exports, using the same data as Nunn (2007).

for improved management techniques and other organizational features, focusing on industry specialization provides us with a second micro-macro connection between workplace organization and the effect of trust on economic performance, albeit an indirect one. The key empirical question that I address in this paper subsequently is how trust affects whether countries are specialized in high-autonomy industries or in low-autonomy industries.

Incorporating workplace organization in a bottom-up channel for the economic consequences of trust, my paper resonates with the broad and long-standing literature on economic organization and the division of labor (Alchian and Demsetz 1972; Becker and Murphy 1992; Williamson 1975). Moreover, trust has already been related to the size of organizations (Fukuyama 1995; La Porta et al. 1997). In fact, trust is a key issue in business and management as well (Dirks and Ferrin 2001; Kramer 1999). Finally, Acemoglu et al. (2007) and Costinot (2009) provide related theoretical analyses. The former model a firm's decision to adopt a certain technology as a function of contracting institutions, among others, which are then linked to comparative advantage. The latter studies a model in which institutions allow firms within a country to adopt certain organizational practices that affect in which industries the country becomes an exporter.

Workplace organization, specifically work autonomy, provides the starting point for my analysis. A straightforward definition of work autonomy is as "the condition or quality of being self-governing or free from excessive external

control" (Jermier and Michaels 2001: 1006). I have the following hypothesis: *the higher a country's level of trust, the more this country is specialized in industries characterized by high levels of work autonomy in their production processes*. Autonomy for workers is associated with various advantages for firms, deriving from the division of labor and specialization in the production process (e.g., Becker and Murphy 1992). Granting specialist workers the autonomy to organize their productive activities in the way they deem fit results in a more efficient production process than when a non-specialist manager tells workers exactly what they should be doing. However, a disadvantage of giving employees freedom to perform their job in their own way is that, in the absence of monitoring and control, it can be difficult to get employees to act in the best interest of the firm, as highlighted by the classic principal-agent problem. In short, for firms, work autonomy only pays off if this autonomy is accompanied by a certain level of trust so that the principal can rely on the agent to foster the principal's interests despite a lack of formal incentives. Otherwise, costs due to shirking are likely to outweigh the benefits of having expert workers that can leverage tacit skills and uncodified knowledge. I therefore expect that industries characterized by highly autonomous work environments will flourish in high-trust societies, while these industries will struggle in low-trust societies. More concretely, I find that countries will be specialized in those industries for which their informal institutional endowments provide a useful resource for firms active in these

industries and vice versa.[4]

To test my hypothesis, I adopt the cross-country cross-industry estimating equation from Rajan and Zingales (1998). Results confirm my hypothesis, showing that countries with higher (lower) social trust are specialized in high-autonomy (low-autonomy) industries. Effect sizes are large and results are robust to a variety of checks, including the use of alternative measures of industry work autonomy. To identify the causal effect of trust on industry specialization, I expand on Algan and Cahuc's (2010) approach of using trust scores from migrants to measure the cultural component of social trust that is independent of countries' economic and institutional environment. The resulting set of trust indicators affirms the causal role of trust in determining cross-country patterns of industry specialization. Overall, the evidence thus provides strong empirical support for the idea that trust interacts with workplace organization to affect the comparative economic development of nations.

This paper, then, makes two main contributions, an empirical one and a broader, conceptual one. Extant studies of the economics of trust leave us wondering about the exact channel through which trust between parties to an exchange affects economies and comparative development. The basic logic—

[4] Naturally, trust may affect economic activity both along the intensive and along the extensive margin. However, for this paper, I am not interested in such effects strictly but in the more fundamental effect of trust on comparative economic development, as measured by industry specialization.

running through uncertainty reduction and lowering of transaction costs—is obvious, but lacks detailed evidence on the steps involved, particularly at the micro level, which is the level at which we expect trust to act as an informal enforcement mechanism that facilitates exchange between economic actors. My main empirical contribution subsequently is to pin down a much-lacking bottom-up channel for some of the macroeconomic consequences of trust. Starting with workplace organization at the micro level and going up all the way to comparative economic development at the macro level, this paper's empirical evidence shows how trust between two parties can go on to affect societies as whole.

The paper's broader contribution lies in connecting important research areas and integrating them to present a more penetrating analysis of comparative economic development than heretofore. Institutions, formal ones such as rule of law and informal ones such as culture and social trust, are widely recognized as vital determinants of the economic performance of nations because they shape the attitudes, beliefs, and actions of economic actors. Similarly, there is increasing interest in workplace organization and organizational design as key determinants of firm performance. Nevertheless, even though the economic performance of nations is crucially driven by the performance of firms, these two performance literatures have mostly developed disjointedly. My paper, however, shows a way of integrating the two strands of research, setting an example for how to forge the kind of micro-macro connection that seems vital for better understanding

economic development and the role of informal institutions therein.

I. Autonomy as a Feature of Workplace Organization

A. *Measuring Work Autonomy*

Management scholars have long been interested in features of workplace organization, specifically what workers actually experience in their jobs (see Hackman and Oldham 1975, Herzberg 1966, Turner and Lawrence 1965, and Walker and Guest 1952 for early work). Adam Smith's (1776) famous description of a pin factory is thereby identified as the first contribution on this topic (Oldham and Hackman 2010). Issues researched range from the variety or repetitiveness of job tasks to the feedback that workers receive and the amount of autonomy that they are granted. The typical approach to measuring work autonomy (or other features of workplace organization) is via surveys, specifically questionnaire items that ask respondents to report on the level of autonomy or freedom that they experience in their work (Pierce and Dunham 1976; Sims et al. 1976). Different survey instruments are available and the most widely used instruments simply ask respondents something along the following lines: "Using this card, please say how much the management at your work allows/allowed you to decide how your own daily work is *organised.*" This item is included in the European Social Survey or

ESS (Jowell and the Central Co-ordinating Team 2007), a cross-national survey of 30 Eurasian countries, and actually the main item that I draw on in this paper. Respondents can rate their level of work autonomy from 0, "I have/had no influence" to 10, "I have/had complete control." Of course, many different item wordings are possible. The US General Social Survey or GSS (Smith et al. 2012), for instance, presents a statement to respondents ("I am given a lot of freedom to decide how to do my own work") and offers four possible answers ("1 - Not at all true," "2 - Not too true," "3 - Somewhat true," and "4 - Very true").[5] The basic idea is always the same, however, namely that people report on their experienced level of work autonomy.

B. *Validity of Measured Work Autonomy*

A concern with the typical work autonomy measure is that it is subjective, based on individuals' perceptions, which could result in biases. Of course, subjective data in general are widely used in economics (e.g., inflation expectations) and the concept of work autonomy has already been much studied in management (see Jermier and Michaels 2001 for a review). Nevertheless, to gather some explicit evidence on the validity of measured work autonomy, I adopt

[5] For this last example, I have reverse coded the original answer categories of the item to let higher scores indicate higher levels of work autonomy.

the standard approach to assessing construct validity in psychology, which is to check how a measured construct relates to other constructs that would theoretically relate to the construct of interest in specific ways (Cronbach and Meehl 1955). If a construct is valid, it should exhibit logical relationships with other constructs, for instance, scores on an intelligence test should not have a negative association with scores on the college aptitude test (SAT) but should coincide with higher educational attainment on average.

Taking this approach, I find that measured work autonomy relates to a variety of other factors in a manner that provides strong validation of the construct (Table A.1 in Appendix A). Notably, managers have higher levels of work autonomy than subordinates do and the higher educated are granted more autonomy than people with lower levels of education are. In addition, levels of work autonomy relate to other perceived features of workplace organization, specifically the amount of influence people have on organizational decisions. Furthermore, I find the same relationships when using different indicators of work autonomy and data collected in different surveys, both nationally (the GSS) and cross-nationally (e.g., the ESS) (Panels a, b, and c in Table A.1). Not reported in Table A.1, the ESS and GSS further include data on respondents' tenure with their employer and experience in their current job, enabling me to calculate a correlation between work autonomy and tenure or experience. Correlations equal .096 (n=18,241; p = .000) for tenure (ESS) and .091 (n=4620; p =.000) for current job experience

(GSS). These positive correlations support both the idea that principals are more willing to trust agents with whom they have a longer relationship and the idea that, with experience, an agent accumulates a unique set of skills that is used most efficiently when the principal grants the agent the freedom to organize his/her work in the way the agent deems fit and with little opportunity for the principal to monitor the agent's performance (on this latter point, see also Table 1 and the last paragraph of this section). Overall, patterns found are precisely the patterns that we expect from valid measures of work autonomy, strongly suggesting that indicators of work autonomy indeed measure what they are supposed to measure.

Further evidence on the validity of measured work autonomy comes from relating the level of work autonomy to other features of organizations. I use the GSS data to examine how employees' level of work autonomy correlates with these employees' personal assessment of their organizations' performance, specifically whether workers find that their employers provide them with the right conditions to be productive. Given the limitations of subjective performance assessments and the perceptual nature of all the variables involved (both on the left-hand side and on the right-hand side), I do no want to emphasize the results of this empirical analysis too much. However, I do find a strong positive relationship between work autonomy and subjectively assessed organizational performance, which supports the validity and relevance of work autonomy (see Table A.2 in Appendix A).

<< Insert Table 1 about here >>

Finally, in light of the theoretical backdrop to this paper, a most important question is how measured work autonomy relates to specialization and the idea of acquiring job-specific tacit knowledge and skills. Divided labor in the production process means that workers are specialists that have gained unique, uncodifiable knowledge on how best to perform and organize their productive activities (e.g., Becker and Murphy 1992). As it turns out, there indeed is a strong relationship between work autonomy and the acquiring of a unique set of skills (Table 1). Specifically, higher levels of work autonomy go together with an increased need to learn new things on the job (top rows of Table 1) and, especially, a greater requirement of job-specific work experience (bottom rows of Table 1). Hence, measures of work autonomy not only have construct validity (Tables A.1 and A.2), but are also valid in relation to the standard theories of economic organization and the division of labor on which this paper builds.

II. A Measure of Industry Work Autonomy

In this section I construct a measure of industry work autonomy and demonstrate its reliability. Valid measures of the level of autonomy that

employees are granted at work offer a great opportunity to benchmark industries on the basis of micro-level features of their work environments, in turn allowing me to establish a bottom-up channel for the macroeconomic consequences of trust that is rooted in the economics of workplace organization.

My approach is to employ individual-level data on work autonomy and construct an industry benchmark that captures how people in specific industries work together to add value to intermediate inputs. By nature of their production processes and how these are organized, industries may be characterized as having more or less autonomous work environments. Taking this micro-level approach, I ensure that my analysis of the comparative economic development of nations is consistent with and, in fact, strongly rooted in our understanding of trust as a factor shaping how economic actors interact with each other. More broadly, in my approach, institutions, specifically social trust, can affect comparative economic development through specific features of industries' micro work environments that are either hampered or fostered by the presence of these institutions.

I measure industry work autonomy using the first four waves of the cross-national ESS data set introduced in the previous section. The ESS classifies respondents' industry of occupation using two-digit NACE codes.[6] An important

[6] The NACE codes used are of revision 1.1. With the fifth wave of the ESS, the industry classification has changed to NACE revision 2. Relying on the first four waves gives us the maximum amount of individual-level observations for the calculation of industry autonomy scores.

feature of my industry work autonomy is that it comprises individual-level data from multiple countries and not just one country, as is typical in the literature. A problem plaguing cross-country cross-industry studies is so-called benchmarking bias, which can shift estimates downwards or upwards (Ciccone and Papaioannou 2010; Nunn and Trefler 2013). A downward, attenuating bias occurs because the benchmarking of industries is subject to random measurement error. The upward, amplifying bias derives from the fact that benchmarking industries based on data from only one country (e.g., the US) likely results in an industry benchmark that is reminiscent of the specific institutions in this country that affect its industrial structure. An upward bias, then, occurs because the resulting benchmark is more accurate for countries that are institutionally more similar to the country used for the original benchmarking of industries. I calculate the measure of industry work autonomy using data from 30 highly institutionally diverse countries, which likely alleviates the problem of benchmarking bias.[7] Nevertheless, as a robustness check, I repeat my baseline analysis using two alternatives to my main measure of industry work autonomy. For the first alternative measure, I use only individual-level data from countries that have mean levels of work autonomy below the

[7] The 30 countries are Austria, Belgium, Bulgaria, Switzerland, Cyprus, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France, UK, Greece, Croatia, Hungary, Ireland, Israel, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Russia, Sweden, Slovenia, Slovakia, Turkey, and Ukraine. In terms of institutional diversity, these countries cover all five legal origins recognized in the literature (common law, French law, German law, socialist law, and Scandinavian law) and seven out of the 12 clusters of national culture identified by Hofstede (2001), the world's leading cross-cultural researcher.

average of the 30 countries. For the second alternative measure, I use only individual-level data from countries that have mean levels of work autonomy above the average of the 30 countries (see Table B.1 in Appendix B). Dividing the work autonomy data this way ensures that I have two samples comprising roughly the same number of individuals when calculating the alternative measures of industry work autonomy (see, also, Note 5). At the end of this section, I also check the reliability of my industry work autonomy measure, which relates to the issue of random measurement error in industry benchmarks.

I calculate industry work autonomy as the mean level of work autonomy reported by all respondents working in a particular industry. Table 2 (Panel a) presents the results for the 24 industries for which I also have data on industry specialization (see the next section). Although the 24 industries are somewhat similar—none belong to the services sector—there is substantial variation in average work autonomy. Measured industry differences thereby have face validity with the Manufacture of medical, precision and optical instruments, watches and clocks involving much more autonomy in the production process than the Manufacture of textiles, for instance. Furthermore, measured differences between the 24 industries coincide with our intuition concerning traditional sectors that have comparatively little potential for dynamic efficiency gains (e.g., Manufacture of tobacco products) and sectors that are more high-tech and have comparatively much potential for dynamic efficiency gains (e.g., Manufacture of

office machinery and computers). I find similar industry differences for the alternative measures of industry work autonomy (Table B.1 in Appendix B).

To provide a comparative perspective, I also present aggregated autonomy scores for the second least autonomous industry, after the Manufacture of textiles (Mining of coal and lignite, extraction of peat, NACE code 10), and for some high-autonomy industries also not considered in the empirical analysis (Table 2, Panel b). In general, average work autonomy in the sample is below the average level of work autonomy across all industries (see bottom rows of Panels a and b in Table 2).

<< Insert Table 2 about here >>

Although employing cross-national data alleviates (benchmarking) biases, a remaining question is whether the measure of industry work autonomy is reliable (e.g., Cronbach and Meehl 1955). A particular concern is whether enough workers per industry have responded to the questionnaire item on work autonomy to render consistent results for the measured differences in industries' micro work environments. To check the reliability of the industry work autonomy measure, I triangulate measures of aggregate work autonomy across three different surveys (Table 3). These surveys have employed comparable but not identical questionnaire items to measure work autonomy. Moreover, data have been

collected in a highly diverse group of countries, notably the US (GSS data), the Eurasian countries covered by the ESS data, and other countries from all over the world, e.g., Japan, Philippines, Mexico, Taiwan, South Africa, South Korea, and Dominican Republic (ISSP data). Notwithstanding, correlations between the various measures of aggregate work autonomy are strong, typically well above .70.

<< Insert Table 3 about here >>

These high correlations between aggregated autonomy scores constructed from different questionnaire items and data collected in countries with highly diverse institutional environments indicate that measures of industry work autonomy are, in fact, highly reliable, and not nearly as susceptible to measurement error as one might expect. Whether we use data from Eurasian countries, the US, or a varied set of countries worldwide, the differences in aggregate work autonomy that we find are highly similar, independent of the sample or the precise measure of work autonomy used. Still, reliability (as evidenced by the correlations between the three measures) tends to improve from having more individual-level respondents on which to base the work autonomy score of an industry (e.g., Panel a of Table 3 versus Panel b of Table 3). The most reliable results are obtained when there are at least 100 respondents per industry

(Panel c of Table 3). In the empirical analysis, I therefore only include industries that meet this observational threshold. As it turns out, all industries depicted in Panel a of Table 2 meet this threshold (the lowest number of observations for the measure of industry work autonomy is 107).

III. Estimating Equation and Data

The theoretical rationale for my proposed bottom-up channel for the macroeconomic consequences of trust involves two simple steps. At the micro level, I find that trust offers a solution to the principal-agent problem that occurs when firms (principals) grant autonomy to their workers (agents). Specifically, I find that the costs due to shirking in the absence of monitoring and control are more likely to outweigh the benefits of work autonomy (efficiency gains due to specialization) in high-trust societies than in low-trust societies. Correspondingly, I expect that, at the macro level, high-trust countries are specialized in industries characterized by more autonomous work environments, simply because these industries will thrive more in high-trust countries compared to low-trust countries and vice versa. To pin down how trust between parties to an exchange can go on to affect the comparative economic development of societies as a whole, this section subsequently incorporates the micro-level evidence on economic exchange embodied in the measure of industry work autonomy in an analysis of

the revealed comparative advantage of nations along the lines of Nunn (2007) and Romalis (2004).

A. *Estimating Equation*

I test the hypothesis that social trust generates a comparative advantage in high-autonomy industries by estimating the following standard equation:

$$(1) \qquad \ln R_{cit} = \beta_0 + \beta_1 a_i T_c + \beta_2 s_i H_{ct} + \beta_3 a_i H_{ct} + \beta_4 H_{ct} + u_i + U_c + Y_t + \varepsilon_{cit} .$$

In this equation, $\ln R_{cit}$ denotes the natural logarithm of the revealed comparative advantage of country c in industry i at time t, a_i is the measure of industry work autonomy, and T_c is a country's trust level. The key term in this equation is the interaction between industry work autonomy and trust ($a_i T_c$). By my hypothesis, a high trust level interacts with workplace organization to generate a comparative advantage in high-autonomy industries so that I expect a positive coefficient for this trust interaction.

A concern with the trust interaction is that both social trust (T_c) and industry work autonomy (a_i) proxy for another set of industry features and country factors that also interact to affect industry specialization. Notably, trust and industry work autonomy appear closely related to human capital, not least as firms seem more

likely to grant autonomy to workers when these workers are better skilled and more highly educated.[8] Hence, to make sure that we are capturing the genuine effect of trust interacting with work autonomy to affect industry specialization and not any effect due to human capital and skill intensity, Eq. 1 includes two more interaction terms. The first of these interaction terms involves the high skill intensity of industries and countries' human capital endowment (s_iH_{ct}), where the subscript t denotes that human capital endowment, just like revealed comparative advantage (), can vary over time. The second additional interaction term involves industry work autonomy and again countries' human capital endowment (a_iH_{ct}). Together, these two additional interaction terms help rule out any spurious effects that otherwise might be captured by the trust interaction but that, in reality, derive from a country's human capital endowment or from an industry's level of skill intensity. Following the argument as to why the interaction between trust and workplace organization may spuriously capture effects driven by human capital endowments, I expect positive coefficients for both the high skill intensity interaction (s_iH_{ct}) and the work autonomy human capital interaction (a_iH_{ct}).

Finally, the estimating equation includes industry (u_i) and country fixed

[8] See Romalis (2004) for evidence on human capital as a factor determining international trade flows across countries and industries. For work on the effect of trust on human capital, see, for example, Coleman (1988). Bjørnskov (2009) provides cross-country evidence on the effect of trust on schooling. The relationship between industry work autonomy and human capital intensity is apparent from Table A.1 in Appendix A, but also intuitively from gauging some of the industries and their mean level of work autonomy, e.g., the Manufacture of medical, precision and optical instruments, watches and clocks, which appears much more skill-intensive than the Manufacture of textiles (see the previous section and Table 2).

effects (U_c), which is standard. However, as I am able to have repeated measures of revealed comparative advantage, I can include year fixed effects (Y_t) as well, even though is little reason to expect that year-specific measurement error will somehow affect my results. Because my main interest is in the effect of social trust, which is considered a stable cultural trait of societies, I cluster my standard errors at the country-industry level.

B. *Data*

Dependent Variable.—My measure of industry specialization is Balassa's (1965) well-known index of revealed comparative advantage (RCA). This index defines the revealed comparative advantage of industry i in country c as: $RCA_{ic} = (X_{ic} / X_c) / (X_i / X)$, where X_{ic} denotes exports of industry i in country c, X_c denotes total exports by country c across all industries, X_i denotes total exports of industry i in all other countries combined (i.e., the rest of the world), and X denotes total exports by all other countries combined. While extant literature typically has exports as the dependent variable, I find that Balassa's index is more informative of comparative economic development, as it provides direct evidence on the extent to which a country is specialized in a specific industry. Data come from the Database for Structural Analysis (known as the STAN database) maintained at the OECD (OECD 2010).

The RCA data in STAN cover the years 1999-2008. However, human capital data are available for fewer years, so that my main sample covers the years 2000 and 2005-2008. In total, I am able to match industry autonomy scores to data on RCA for 24 industries from the STAN database (see Table 2).[9] As data on Luxembourg are missing, the STAN database has data available for 29 countries, all OECD members. The empirical analyses thus concern a total of 696 (= 24 x 29) country-industry observations. These country-industry combinations are the main unit of observation in my analysis. The total number of observations is 3384 (out of a theoretical maximum of 5 x 696 = 3480 observations). However, as a robustness check, below I also analyze a larger sample that does not include data on human capital. Table B.1 in Appendix B presents descriptive statistics for the industries included in the analysis. Table B.2 in Appendix B depicts the countries in the sample.

Key Independent Variables.—Eq. 1 has two key independent variables. The first is the measure of industry work autonomy described in the previous section. The second is social trust. I use the measure of trust available from the World Values Survey or WVS (European Values Study Group and World Values Survey Association 2006; World Values Survey Association 2009). This canonical measure derives from the dummy-coded questionnaire item asking respondents

[9] The STAN database covers more industries, but these are not at the two-digit level, for instance, because they collapse data for two industries into one.

whether they find "most people can be trusted" (score of 1) or "you need to be very careful in dealing with people" (score of 0). The WVS has collected trust data in five different waves, spanning the period 1981-2008. I follow the standard procedure in the literature, which is to calculate country trust scores by aggregating responses from all waves, meaning that for most countries I include responses from more than one wave. This procedure matches the conception of trust as a stable cultural trait of societies with deep historical and biogeographic roots (Buggle and Durante 2014; Guiso et al. 2008; Nunn and Wantchekon 2011; Van Hoorn 2013). Table C.1 in Appendix C presents scores on the trust measure for the 29 countries in the sample.

Other Main Independent Variables.—Eq. 1 contains two other important independent variables, one time-varying country-level variable and one variable at the industry level. At the country level, I measure human capital endowment using data on average years of schooling from the United Nations Development Programme (UNDP) statistical database (UNDP 2014). This database provides the most frequently updated measure of countries' human capital endowment, matching most closely with the 1999-2008 time-series for the dependent variable. Data are available for the years 2000 and 2005-2008, and for all countries in the sample. Table B.2 in Appendix B presents descriptive statistics, showing that human capital endowment has changed quite a bit during the period covered, for instance in Germany and Finland.

At the industry level, I measure the intensity with which an industry uses high-skilled labor in the same way as I have measured industry work autonomy, by aggregating individual-level data from the ESS. I again draw on the first four waves of the ESS, and construct a dummy variable that gets a score of 1 if the respondent has had at least some tertiary education (ISCED classification V1 or higher; see Panel c of Table A.1 in Appendix A) and 0 otherwise. Aggregating this dummy variable at the industry level renders percentage scores denoting each industry's level of high skill intensity. Percentage scores can range from 2.97% (Agriculture, hunting, related service activities) to 20.9% (Manufacture of office machinery and computers). Table B.2 in Appendix B presents complete scores for all industries in my sample.

Following the same procedure as just outlined, I also construct an alternative measures of industries' skill intensity that refers to average years of education. I use this measure below to assess the robustness of my baseline results. Table B.2 in Appendix B presents details including the full set of industry scores.

IV. The Empirics of Trust, Workplace Organization, and Comparative Economic Development

A. *Baseline Results*

Table 4 presents the baseline results, obtained by estimating different specifications of Eq. 1. Providing strong support for my hypothesis, there is a statistically highly significant interaction effect between trust and workplace organization so that societies with higher trust levels are specialized in industries characterized by more autonomous work environments, and vice versa (Model 1). This relationship between trust, workplace organization, and industry specialization remains when controlling for confounding effects associated with countries' human capital endowment and the intensity with which industries use high-skilled labor in their production processes (Models 2-4). The coefficients for the interaction terms involving human capital both have the expected sign and are statistically significant at usual levels when included separately (Models 2-3). Including both interaction terms simultaneously, however, neither of the terms is statistically significant at usual levels, while the trust interaction is (Model 4).

<< Insert Table 4 about here >>

More important than statistical significance, the trust interaction is also highly significant in terms of effect size. As I report standardized beta coefficients, we can easily ascertain that a one standard deviation increase in the trust interaction is associated with an increase in revealed comparative advantage of about one standard deviation, ceteris paribus. Naturally, the magnitude of the coefficient for

the trust interaction decreases a bit when adding control variables, but overall the relationship between the trust interaction and industry specialization remains strong. Effect sizes are especially large compared to other studies of the institutional determinants of comparative advantage. Nunn (2007), for instance, reports a standardized beta coefficient of about .33 for his interaction term involving judicial quality and the contract intensity of an industry, although in his models variance explained is much higher ($R^2 \approx .75$). There is no real discrepancy between stronger effect sizes on the one hand and poorer model fit on the other hand, however, as these differences reflect that Nunn (2007) does not consider differences in countries' comparative advantage directly but indirectly, via differences in industry exports, which are much more dependent on country fixed effects than is revealed comparative advantage.[10]

In terms of the aim of this paper, these baseline results provide strong support for the bottom-up channel that allows trust to affect comparative economic development via workplace organization. Trust acts as an informal mechanism that promotes the granting of work autonomy to agents by principals, allowing industries characterized by highly autonomous micro production environments to flourish in high-trust societies, in turn resulting in predictable patterns of industry

[10] Tabellini (2008) uses Nunn's (2007) data to consider the role of trust in addition to judicial quality. His results compare to my results in the same way as Nunn's (2007) results compare to my results, except that the interaction between trust and contract intensity is far less important for understanding industry exports than is the interaction between judicial quality and contract intensity considered by Nunn (2007).

specialization at the macro level.

B. *Robustness Checks*

To assess the robustness of the baseline results presented in Table 4, I perform several additional checks. I start with a very simple and general check that explicitly deals with outliers. For this purpose, I re-estimate Eq. 1 (Model 4 in Table 4) using quantile regressions and a sample that excludes any observations that score more than two standard deviations below or above the mean on either revealed comparative advantage ($\ln R_{cit}$) or on the trust interaction ($a_i T_c$). Table D.1 in Appendix D presents the results. As expected, initial relationships found are robust and in all cases the coefficient for the interaction between trust and industry work autonomy remains strongly positive and highly statistically significant.

As indicated in the previous section, to address potential benchmarking biases (Ciccone and Papaioannou 2010; Nunn and Trefler 2013), I check the robustness of my baseline results to the measure of industry work autonomy used. Results show that the relationship between trust and industry specialization continues to hold when using the two alternative measures of industry work autonomy (Models D5 and D7 in Table D.2 in Appendix D). Estimates are less precise, but this is as expected given that the two alternative measures are based on less

information (i.e., on fewer individual-level observations) than the original measure of industry work autonomy and, therefore, have a larger measurement error. In terms of attenuating or amplifying bias, using the two alternative measures of industry work autonomy renders both a larger and a smaller coefficient for the trust interaction compared to models that concern the same sample but employ my original measure of industry work autonomy (Model D5 versus Model D6 and Model D7 versus Model D8). Being in between, I conclude that the original industry work autonomy measure renders estimates that are largely unbiased, neither over- nor understating the extent to which trust and workplace organization interact to shape cross-country patterns of industry specialization.

Expanding on the industry benchmarking check, I also assess whether the baseline results are robust to using the alternative measure of industry skill intensity that I have constructed. Again, results are largely the same as before with the model including the alternative industry skill intensity measures (Model D9 in Table D.2) rendering an almost identical coefficient for the trust interaction as the model estimated using the original industry skill intensity measure (Model 4 in Table 4).

A further issue to consider is that my main sample covers only five years, even though data on revealed comparative advantage are available for five more years, covering the complete period from 1999 to 2008. As discussed, my main

sample is constrained by the availability of data on human capital endowments. However, excluding data on human capital and expanding the coverage of the sample does not affect results either. In fact, in the larger sample the coefficient for the trust interaction is slightly higher than before, 1.35 for Model D10 in Table D.2 versus 1.29 for Model 1 in Table 4.

Finally, a most salient concern with the results presented in Table 4 remains the possibility of an omitted variable bias. The two interactions in Eq. 1 that involve human capital (s_iH_{ct} and a_iH_{ct}) mean that I control for the most obvious confounders. However, so far, I have not accounted for the potential role of features of countries' formal institutional environment. The quality of contracting institutions, in particular, has been found to determine industry export flows (Levchenko 2007; Nunn 2007) and institutional quality has further been linked to social trust (Aghion et al. 2010; Bjørnskov 2011; Tabellini 2008). I actually find that there is little theoretical reason to expect that formal institutional arrangements interact with industry work autonomy to affect industry specialization in a meaningful way. Rather, given the nature of the concept of work autonomy, almost by definition, it does not involve any formal contract or agreement between the principal and the agent that could be subject to enforcement through formal institutions. Hence, beforehand I do not expect that institutional quality will do much to affect the extent to which countries are specialized in high- or low-autonomy industries. Nevertheless, to be complete, I

seek to rule out any spurious effect that might derive from not controlling for quality of formal institutions. Results (Model D11 in Table D.2) are consistent with prior expectations, showing that the effect of trust on industry specialization is indeed robust to controlling for institutional quality.

C. *Dealing with Potential Endogeneity through Measures of the Cultural Component of Social Trust*

Although the above results are suggestive of trust causally interacting with workplace organization to affect comparative economic development, without additional evidence we cannot rule out that there is reverse causality between social trust and countries' specialization in certain industries. Indeed, the positive relationship between the trust interaction and revealed comparative advantage could also be consistent with a process in which countries that are specialized in high-autonomy industries tend to develop cultural attitudes and beliefs that support the workings of these industries. Ordinarily, one would deal with this endogeneity problem via instrumental variables analysis. Instrumenting for trust is notoriously problematic, however, as the factor(s) that could instrument for trust typically also instrument for other determinants of industry specialization, notably quality of formal institutions (e.g., Algan and Cahuc 2013; Tabellini 2008), thus violating the exclusion restriction.

My solution is to construct different indicators of trust that capture the stable cultural component of trust, meaning that these indicators are as much as possible independent of economic and institutional influences in general and of contemporaneous patterns of industry specialization in particular. I apply two approaches to construct two alternative trust indicators each, for four indicators in total. The first approach is simply to construct historical indicators that refer to trust levels before the start of my sample in 2000. The WVS, which I used to calculate my main trust indicator, started collecting responses to the trust item in 1981. In the 19 years before 2000, enough trust data have been collected that I can discard all responses after 1999 and still calculate social trust scores for all countries in my sample. In principle, using only individual responses from before 2000 is enough to rule out any direct effect of industry specialization on this measure of social trust, not least as all my models include country fixed effects (see Eq. 1). However, as a stricter cut-off, I also apply an additional five-year lag between the start of my sample and the last year in which individual trust scores have been collected. Table C.1 in Appendix C presents country scores on the two trust indicators thus constructed. The pre-1995 trust indicator thereby is available for 27 countries, while, as stated, I can calculate pre-2000 trust scores for all 29 countries in my sample.

My second approach is to use trust levels reported by migrants to proxy for social trust in these migrants' countries of ancestry (cf. Algan and Cahuc 2010).

Though predetermined, a concern with plain historical trust indicators is that they are still not completely free from influences other than the purely cultural component of trust. Migrants, on the other hand, are a special group, as they can still harbor their culturally determined trust attitudes but are not affected by the reigning economic and institutional conditions in their ancestry countries, simply because they no longer reside in these countries. Accordingly, the remaining country-of-ancestry effects are a direct reflection of the cultural component of trust, while the only economic or institutional influences on migrants' trust levels are due to the economic and institutional conditions in their destination countries. Moreover, when considering second-generation migrants, we can further rule out indirect effects associated with the intergenerational transmission of attitudes. Parents may make a rational choice as to which attitudes to transfer to their offspring, opting for those attitudes that maximize their offspring's likelihood of succeeding in the economic and institutional environments in which they will need to function (cf. Bisin and Verdier 2001). If so, the attitudes of a first-generation migrant could still reflect the economic and institutional conditions of the ancestry country. By the same mechanism, however, the attitudes of second-generation migrants will be void of any non-cultural country-of-ancestry effects, as these migrants' attitudes will be geared fully towards the economic and institutional environment of the destination country. The data that I use to construct the two indicators of the cultural component of trust based on migrant

trust come from the ESS (Waves 1-5 / 2002-2010). Appendix C gives a detailed description of the construction of the two indicators. Table C.1 again presents country scores.[11]

<< Insert Table 5 about here >>

Table 5 presents the results for the four trust indicators. In all cases, the trust interaction remains highly statistically significant and sizeable. Estimates can be less precise, however, but this is understandable given that the alternative trust indicators are based on relatively few underlying individual-level observations, particularly the one based on data from second-generation migrants. Overall, I conclude that trust indeed causally interacts with workplace organization to shape cross-country patterns of industry specialization.

V. Conclusions

The idea of specialization through the division of labor is one of the most powerful ideas in economics. Trust subsequently is widely recognized for its role as a social lubricant, fostering mutually beneficial exchange and thereby

[11] Compared to the US General Social Survey (GSS) data used by Algan and Cahuc (2010), the ESS data are much richer, allowing me to construct these trust indicators for the largest share of countries in my sample (and, if needed, many more countries that are not in my sample).

sustaining higher levels of specialization. Moreover, many studies show that trust is a robust factor in economic development. What is lacking, however, is a clear pathway that can take us from the micro logic of trust as a promoter of economic exchange to the macro evidence on the effect of trust on economic development. In this paper, I have developed such a bottom-up channel, pinning down exactly how trust matters for the interaction between economic actors at the micro level in a way that affects comparative economic development at the macro level. Specifically, my empirical analysis shows that trust interacts with workplace organization to determine countries' comparative advantage and shape cross-country patterns of industry specialization.

The paper's broader contribution lies in the joining of two important literatures that so far remained unconnected. Significant advances have been made in the literature on the effect of workplace organization and organizational design on firm performance (e.g., Bloom et al. 2014; Syverson 2011) and in the literature on the macroeconomic consequences of informal institutions, particularly trust (e.g., Algan and Cahuc 2013; Gorodnichenko and Roland 2011; Guiso et al. 2006). Unfortunately, until now, these developments have been happening largely independent from each other. The micro-macro connection that I have developed in this paper, however, acts as a lynchpin that brings the two literatures together and integrates them. A most fruitful avenue for future research is to establish further lynchpins, where the bottom-up channel involving

workplace organization, as analyzed in this paper, may provide a guide towards integration of other types of microeconomic insights in the study of comparative economic development at the macro level.

Future research could also address some of the limitations of the paper's empirical analysis. Most importantly, data availability has kept me from analyzing a global sample of countries, analyzing a sample of OECD countries instead. The narrow nature of this sample, covering only countries in relatively advanced stages of economic and institutional maturity, has likely biased my estimates against finding evidence that trust interacts with workplace organization to affect comparative economic development. Nevertheless, we need follow-up research both to generalize the idea of a bottom-up, micro-macro channel for the economic consequences of (in)formal institutions and to generalize my empirical evidence to globally representative samples.

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Table 1—Work Autonomy and Job Specialization

Variable	Mean work autonomy (0-10)	
Current job: Job requires learning new things		
Not at all true [n=4945]	4.28	(3.71)
A little true [n=9907]	5.31	(3.37)
Quite true [n=12,290]	6.23	(3.16)
Very true [n=11,126]	7.05	(3.01)
Somebody with right qualification, how long to learn to do your job well		
1 day or less [n=1532]	4.06	(3.78)
2-6 days [n=3739]	4.40	(3.57)
1-4 weeks [n=6162]	5.23	(3.42)
1-3 months [n=8045]	5.98	(3.27)
More than 3 months, up to 1 year [n=9819]	6.69	(3.04)
More than 1 year, up to 2 years [n=4337]	7.05	(2.93)
More than 2 years, up to 5 years [n=2307]	7.09	(2.95)
More than 5 years [n=733]	7.24	(2.98)

Notes. Number of observations in square brackets. Standard deviations in parentheses. Data are own calculations based on data from the ESS (Waves 2 and 5 / years 2004 and 2010) (Jowell and the Central Co-ordinating Team 2007).

Table 2—Autonomy as a Feature of Industries' Micro Work Environments

Panel (a): Industries included in empirical analysis	
Industry (NACE classification rev. 1.1, two digits, with code in square brackets)	Industry work autonomy (0-10)
Agriculture, hunting, related service activities [1]	5.88
Forestry, logging, related service activities [2]	5.61
Fishing, fish farming and related service activities [5]	6.03
Manufacture of food products and beverages [15]	4.74
Manufacture of tobacco products [16]	4.20
Manufacture of textiles [17]	3.83
Manufacture of wearing apparel; dressing and dyeing of fur [18]	3.97
Tanning and dressing of leather [19]	4.08
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials [20]	4.79
Manufacture of pulp, paper and paper products [21]	5.10
Publishing, printing and reproduction of recorded media [22]	6.42
Manufacture of coke, refined petroleum products and nuclear fuel [23]	6.09
Manufacture of chemicals and chemical products [24]	5.85
Manufacture of rubber and plastic products [25]	4.71
Manufacture of other non-metallic mineral products [26]	4.74
Manufacture of basic metals [27]	4.78
Manufacture of machinery and equipment not elsewhere classified [29]	5.29
Manufacture of office machinery and computers [30]	6.27
Manufacture of electrical machinery and apparatus not elsewhere classified [31]	5.12
Manufacture of radio, television and communication equipment and apparatus [32]	5.63
Manufacture of medical, precision and optical instruments, watches and clocks [33]	6.58
Manufacture of motor vehicles, trailers and semi-trailers [34]	5.08
Manufacture of other transport equipment [35]	5.83
Other business activities [74]	6.66
Mean of industry means for industries included in empirical analysis (n=24)	5.30 (.841)

Table 2—*ctd*.

Panel (b): Selected industries, not included in empirical analysis	
Industry (NACE classification rev. 1.1, two digits, with code in square brackets)	Industry work autonomy (0-10)
Mining of coal and lignite, extraction of peat [10]	3.91
Hotels and restaurants [55]	5.47
Education [80]	6.73
Activities auxiliary to financial intermediation [67]	7.24
Research and development, basic research [73]	7.53
Mean of industry means for all industries (n=69)	5.80 (.985)

Notes. Data are own calculations based on data from the first four waves of the ESS, which have been held bi-annually in 2002, 2004, 2006, and 2008. Standard deviations in parentheses.

Table 3—The Reliability of Measuring Industry Work Autonomy

Intercorrelations for different measures of occupational work autonomy	Panel (a): No minimum number of observations per two-digit occupational category		Panel (b): Minimum 20 observations per two-digit occupational category [n=24]		Panel (c): Minimum 100 observations per two-digit occupational category [n=19]	
	Mean occupation score on work autonomy, ISSP	Mean occupation score on work autonomy, GSS	Mean occupation score on work autonomy, ISSP	Mean occupation score on work autonomy, GSS	Mean occupation score on work autonomy, ISSP	Mean occupation score on work autonomy, GSS
Mean occupation score on work autonomy, ESS	.773 [n=36]	.598 [n=27]	.875	.634	.921	.811
Mean occupation score on work autonomy, ISSP	1	.702 [n=27]	1	.741	1	.849

Notes. Number of observations in square brackets. Since data on respondents' industry (e.g., NACE codes) are seldom collected in surveys, I have calculated worker autonomy scores for occupations instead. I used data on respondents' occupation measured by ISCO (International Standard Classification of Occupations) codes. I thereby collapsed four-digit ISCO codes into two-digit codes as a way to make them comparable to the two-digit NACE codes used for Table 2. Data are own calculations based on data from the ESS (first four waves / years 2002-2008), from the GSS (years 2002, 2006, and 2010), and from the 2005 ISSP Module on Work Orientation (ISSP Research Group 2013). The ISSP data have been collected in the following country regions (32 in total): Australia, West-Germany, East-Germany, UK, US, Hungary, Ireland, Norway, Sweden, Czech Republic, Slovenia, Bulgaria, Russia, New Zealand, Canada, Philippines, Israel, Japan, Spain, Latvia, France, Cyprus, Portugal, Denmark, Switzerland, Flanders (Province of Belgium), Finland, Mexico, Taiwan, South Africa, South Korea, and Dominican Republic.

Table 4—Work Autonomy, Trust, and Comparative Advantage

	(1)	(2)	(3)	(4)
Trust interaction (a_iT_c)	1.29***	1.09***	.966***	.966***
	(.210)	(.213)	(.233)	(.246)
High skill intensity interaction (s_iH_{ct})	-	.471**	-	.237
		(.226)		(.363)
Human capital work autonomy interaction (a_iH_{ct})	-	-	.770***	.534
			(.293)	(.499)
Human capital (H_{ct})	-	.011	-.418*	-.309
		(.071)	(.214)	(.291)
Country fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of obs.	3384	3384	3384	3384
No. of country-industry combinations	696	696	696	696
R^2 adjusted	.236	.240	.240	.254

Notes. The dependent variable is the natural logarithm of revealed comparative advantage of country c in industry i at time t (see Eq. 1). Sample covers 24 industries (two-digit NACE) in 29 countries for a total of 696 country-industry combinations and spans the years 2000 and 2005-2008. Standard errors (in parentheses) are clustered at the country-industry level and bootstrapped with 250 repetitions. Coefficients are standardized beta coefficients.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 5—The Causal Effect of Trust on Patterns of Specialization in High-/Low-Autonomy Industries

	Historical trust		Cultural component of trust	
	Pre-2000 trust	Pre-1995 trust	Trust of first-generation migrants	Trust of second-generation migrants
	(5)	(6)	(7)	(8)
Trust interaction (a_iT_c)	1.07***	1.17***	1.04***	.840**
	(.248)	(.239)	(.243)	(.356)
High skill intensity interaction (s_iH_{ct})	.237	.429	.237	.554
	(.367)	(.413)	(.365)	(.370)
Human capital work autonomy interaction (a_iH_{ct})	.438	.367	.700	.873*
	(.483)	(.524)	(.489)	(.512)
Human capital (H_{ct})	-.241	-.229	-.426	-.590**
	(.280)	(.300)	(.277)	(.294)
Country fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of obs.	3364	3132	3364	3016
No. of country-industry combinations	696	648	696	624
No. of countries	29	27	29	26
R^2 adjusted	.243	.261	.249	.278

Notes. The dependent variable is the natural logarithm of revealed comparative advantage of country c in industry i at time t (see Eq. 1). Standard errors (in parentheses) are clustered at the country-industry level and bootstrapped with 250 repetitions. Coefficients are standardized beta coefficients.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix

This appendix consists of four parts, labeled A through D. Each part contains one or more tables and some additional explanatory text. Appendix A presents detailed evidence concerning the validity of measures of work autonomy, relating them to a varied set of other constructs logically expected to be related to work autonomy in the same way as scores on an intelligence test are related to educational success (cf. Cronbach and Meehl 1955). Appendix B presents scores and descriptive statistics for key variables in my analyses, separately for industry-level variables and country-level variables. Appendix C presents the different indicators of social trust that I use in the empirical analysis and, where necessary, provides a detailed explanation of how an indicator is constructed. Finally, Appendix D presents the results for the additional models that I have estimated to check the robustness of the baseline results presented in Table 4.

APPENDIX A: VALIDITY OF MEASURED WORK AUTONOMY

Tables A.1 and A.2 report evidence on the validity of measures of work autonomy, specifically measures asking respondents to report on the autonomy they experience at work. Table A.1 straightforwardly presents evidence on how measured work autonomy varies with certain respondent features thought to correlate with the level of work autonomy of the respondent. Table A.2 presents results for a regression analysis and I therefore discuss these results in a bit more detail.

TABLE A.1—Validity of the Work Autonomy Measure

Panel (a): General Social Survey (GSS) data		
Variable	Mean work autonomy (1-4)	
Manager		
Yes [n=418]	3.53	(.736)
No [n=743]	3.31	(.856)
Highest educational degree		
Less than high school [n=405]	3.35	(.859)
High school [n=2346]	3.33	(.864)
Associate/Junior college [n=442]	3.43	(.789)
Bachelor's [n=933]	3.44	(.751)
Graduate [n=512]	3.61	(.641)
In your job, how often do you take part with others in making decisions that affect you?		
Often [n=1907]	3.58	(.658)
Sometimes [n=1663]	3.35	(.794)
Rarely [n=669]	3.14	(.950)
Never [n=396]	3.09	(1.08)
How often do you participate with others in helping set the way things are done on your job?		
Often [n=1554]	3.58	(.685)
Sometimes [n=1181]	3.34	(.784)
Rarely [n=461]	3.12	(.909)
Never [n=277]	3.00	(1.11)
Panel (b): International Social Survey Program (ISSP) data		
Variable	Mean work autonomy (1-3)	
Manager		
Yes [n=7461]	2.20	(.679)
No [n=15,652]	1.88	(.742)

TABLE A.1—Validity of the Work Autonomy Measure, *ctd*.

Panel (b): International Social Survey Program (ISSP) data		
Variable	Mean work autonomy (1-3)	
Education level		
No formal qualification [n=2268]	1.84	(.820)
Lowest formal qualification [n=2763]	1.95	(.807)
Above lowest qualification [n=4284]	1.96	(.753)
Higher secondary completed [n=5315]	1.97	(.729)
Above higher secondary level [n=4743]	2.05	(.705)
University degree completed [n=4879]	2.15	(.672)
Applies to respondent's job: I can work independently		
Strongly agree [n=6302]	2.33	(.694)
Agree [n=11,088]	2.08	(.697)
Neither agree nor disagree [n=2937]	1.71	(.657)
Disagree [n=2854]	1.53	(.666)
Strongly disagree [n=1080]	1.46	(.657)
Panel (c): European Social Survey (ESS) data		
Variable	Mean work autonomy (0-10)	
Manager		
Yes [n=42,319]	7.72	(2.58)
No [n=101,836]	5.18	(3.64)
Education (ES-ISCED)		
I, less than lower secondary [n=6849]	4.50	(3.88)
II, lower secondary [n=14,226]	4.65	(3.80)
IIIb, upper secondary, vocational or no access to V1 [n=22,478]	5.33	(3.65)
IIIa, upper secondary, general and/or access to V1 [n=17,599]	5.77	(3.48)
IV, advanced vocational, sub-degree [n=8496]	6.52	(3.31)
V1, lower tertiary education, BA level [n=9106]	7.34	(2.68)
V2, higher tertiary education, >= MA level [n=9325]	7.42	(2.69)
Current job: can decide time start/finish work		
Not at all true [n=9692]	4.96	(3.50)
A little true [n=3690]	6.33	(2.93)
Quite true [n=2852]	7.41	(2.50)
Very true [n=2395]	8.20	(2.45)

TABLE A.1—Validity of the Work Autonomy Measure, *ctd.*

Panel (c): European Social Survey (ESS) data			
Variable		Mean work autonomy (0-10)	
Years of schooling (seven quantiles)			
Quantile 1 (4.82 years of schooling on average) [n=14,161]		4.88	(3.87)
Quantile 2 (8.51 years of schooling on average) [n=17,334]		4.94	(3.81)
Quantile 3 (10.6 years of schooling on average) [n=25,500]		5.31	(3.69)
Quantile 4 (12.0 years of schooling on average) [n=22,967]		5.66	(3.56)
Quantile 5 (13.0 years of schooling on average) [n=13,780]		6.06	(3.39)
Quantile 6 (14.9 years of schooling on average) [n=29,562]		6.73	(3.14)
Quantile 7 (18.7 years of schooling on average) [n=20,411]		7.36	(2.73)
Allowed to influence policy decisions about activities of organization (0-10)			
0	I have/had no influence [n=38,206]	3.15	(3.65)
1	[n=10,697]	4.18	(3.16)
2	[n=8947]	5.28	(2.82)
3	[n=7264]	5.86	(2.55)
4	[n=5490]	6.15	(2.35)
5	[n=11,206]	6.74	(2.26)
6	[n=6869]	7.31	(1.86)
7	[n=8417]	7.83	(1.70)
8	[n=8695]	8.36	(1.51)
9	[n=4740]	8.88	(1.34)
10	I have/had complete control [n=14,539]	9.80	(.993)

Notes. Number of observations in square brackets. Standard deviations in parentheses. Data come from the GSS (years 2002, 2006, and 2010), the 2005 International Social Survey Program (ISSP) Module on Work Orientation (ISSP Research Group 2013), and the ESS (Waves 1-4 / years 2002, 2004, 2006, and 2008) (Jowell and the Central Co-ordinating Team 2007). The ISSP measure of work autonomy asks respondents "Which of the following statements best describes how your daily work is organized?," giving three possible answers: "1 - I am not free to decide how my daily work is organized," "2 - I can decide how my daily work is organized, within certain limits," and "3 - I am free to decide

how my daily work is organized." As with the GSS item, I have reverse coded answer categories for this item so that a higher score indicates more work independence. ISCED stands for International Standard Classification of Education. The division of respondents' number of years of schooling in seven quantiles (ESS data) has been chosen to match the seven categories of ISCED. Waves from the ESS are selected to match the ESS waves that I use later on to benchmark industries by their level of work autonomy.

Supplementing the evidence presented in Table A.1 above, Table A.2 below further relates employees' level of work autonomy to the subjectively assessed performance of their organizations, specifically whether the conditions in their job allow the employee to be productive. As stated in the main text, I find a strong relationship between employees' autonomy and this feature of organizational performance. The size of the effect is that a one point increase in work autonomy, increases performance by about 0.25 points (both constructs measured on a 1-4 scale). Moreover, the relationship found is robust to controlling for some standard worker characteristics such as sex and age (Model A2) and for other employee attributes, for instance, the person's (un)employment history or whether the person is a manager or not (Model A3). I am further able to rule out respondents' general negativity (known as kvetching) or positivity as a factor that drives both their self-assessed work autonomy and their assessment of their respective organizations' performance (Model A4). Indeed, controlling for such personal sentiments as (dis)satisfaction with household finance or the expected probability of leaving one's job does not overturn the positive relationship between work autonomy and organizational performance or render this relationship statistically insignificant. Finally, work autonomy continues to exhibit a strong positive relationship with organizational performance even when controlling for the extent to which the employee's organization functions smoothly and effectively, which itself is a feature of organizational performance that also appears positively affected by work autonomy (Model A5).

Table A.2—Work Autonomy and Organizational Performance

	(A1)	(A2)	(A3)	(A4)	(A5)
Work autonomy (1-4)	.277***	.241***	.235***	.222***	.103***
	(.013)	(.012)	(.012)	(.012)	(.011)
Sex [1 = female]	-	.041**	.041**	.040**	.018
		(.020)	(.020)	(.020)	(.017)
Age (/10)	-	-.038	-.051	-.004	.046
		(.043)	(.043)	(.043)	(.037)
Age^2 (/100)	-	.010**	.011**	.005	-.002
		(.005)	(.005)	(.005)	(.004)
Education dummies included	No	Yes	Yes	Yes	Yes
Manager [Base category = No]					
Yes (0/1)	-	-	.027	.049	.043
			(.041)	(.041)	(.035)
Missing data (0/1)	-	-	-.017	-.043	-.003
			(.027)	(.028)	(.024)
Unemployment history dummies included	No	No	Yes	Yes	Yes
Financial satisfaction [Base category = More or less satisfied]					
Pretty well satisfied (0/1)	-	-	-	.062**	.042*
				(.027)	(.023)
Not satisfied at all (0/1)	-	-	-	-.116***	-.063***
				(.027)	(.023)
Missing data (0/1)	-	-	-	-.032	-.020
				(.041)	(.035)
Dummies on likelihood of losing job included	No	No	No	Yes	Yes
Dummies on how often job interferes with family life included	No	No	No	Yes	Yes

Table A.2— Work Autonomy and Organizational Performance, *ctd*.

	(A1)	(A2)	(A3)	(A4)	(A5)
Organization runs in a smooth and effective manner (1-4)	-	-	-	-	.462*** (.012)
No. of obs.	4586	4586	4586	4586	4586
R^2 adjusted	.087	.095	.093	.112	.340

Notes. Dependent variable is about whether job conditions allow for productivity. The questionnaire item measuring these conditions for productivity is part of an item battery asking respondents to describe their job: "Now I'm going to read you a list of statements that might or might not describe your main job. Please tell me whether you (1) strongly disagree, (2) disagree, (3) agree, or (4) strongly agree with each of these statements." The specific text reads as follows: "Conditions on my job allow me to be about as productive as I could be." The item on the organization running smoothly and effectively is part of the same series: "The place where I work is run in a smooth and effective manner." As with the work autonomy item, I have reverse coded answer categories for these two items so that higher scores indicate higher performance. The item on unemployment history asks respondents whether "At any time during the last ten years, have you been unemployed and looking for work for as long as a month?" The item on financial satisfaction reads as follows: "We are interested in how people are getting along financially these days. So far as you and your family are concerned, would you say that you are pretty well satisfied with your present financial situation, more or less satisfied, or not satisfied at all?" The dummies on the likelihood of job loss derive from an item asking respondents "Thinking about the next 12 months, how likely do you think it is that you will lose your job or be laid off--very likely, fairly likely, not too likely, or not at all likely?" Finally, the dummies on work interfering with family life derive from an item asking respondents "How often do the demands of your job interfere with your family life." Categorical or dummy independent variables are converted into dummies with a category added for cases with missing data, which allows me to include this independent variable without losing observations. Standard errors are in parentheses.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

APPENDIX B: SAMPLE AND DESCRIPTIVE STATISTICS

This appendix presents information on the main sample. Table B.1 thereby concerns industry-level variables and contains data on two types of variables. The first variable is the dependent variable, revealed comparative advantage or RCA, for which I present summary statistics for each of the 24 industries in my sample. The second type of variable are independent variables in my analysis and concern the benchmarking of industries, both in terms of work autonomy and in terms of the intensity with which they use high skilled labor as an input.

Table B.1—Sample and Descriptive Statistics for Revealed Comparative Advantage (RCA), Alternative Measures of Industry Work Autonomy, and Different Measures of Industry Skill Intensity

Industry (NACE code in square brackets)	RCA	Industry work autonomy (based on below-average work autonomy sample)	Industry work autonomy (based on above-average work autonomy sample)	High skill intensity (percentage high skilled workers)	General skill intensity (average years of education)
Agriculture, hunting, related service activities [1]	1.10 [145] (1.08)	5.24	7.59	2.97%	8.77
Forestry, logging, related service activities [2]	1.82 [116] (3.86)	4.36	7.28	5.13%	10.6
Fishing, fish farming and related service activities [5]	2.75 [145] (5.35)	5.26	-	3.37%	9.36

Table B.1—Sample and Descriptive Statistics for Revealed Comparative Advantage (RCA), Alternative Measures of Industry Work Autonomy, and Different Measures of Industry Skill Intensity, *ctd*.

Industry (NACE code in square brackets)	RCA	Industry work autonomy (based on below-average work autonomy sample)	Industry work autonomy (based on above-average work autonomy sample)	High skill intensity (percentage high skilled workers)	General skill intensity (average years of education)
Manufacture of food products and beverages [15]	1.74 [145] (2.31)	4.02	5.80	5.70%	10.8
Manufacture of tobacco products [16]	.995 [87] (1.37)	-	-	5.15%	9.44
Manufacture of textiles [17]	1.27 [145] (1.46)	3.38	4.66	2.98%	9.16
Manufacture of wearing apparel; dressing and dyeing of fur [18]	1.48 [145] (1.82)	3.68	4.68	2.47%	9.70
Tanning and dressing of leather [19]	1.15 [145] (1.47)	3.91	4.93	3.69%	8.89
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials [20]	1.54 [145] (1.70)	4.13	6.02	3.94%	10.4

Table B.1—Sample and Descriptive Statistics for Revealed Comparative Advantage (RCA), Alternative Measures of Industry Work Autonomy, and Different Measures of Industry Skill Intensity, *ctd*.

Industry (NACE code in square brackets)	RCA	Industry work autonomy (based on below-average work autonomy sample)	Industry work autonomy (based on above-average work autonomy sample)	High skill intensity (percentage high skilled workers)	General skill intensity (average years of education)
Manufacture of pulp, paper and paper products [21]	1.22 [145] (1.60)	4.15	5.78	3.28%	10.8
Publishing, printing and reproduction of recorded media [22]	.919 [145] (.749)	5.76	6.76	13.2%	12.8
Manufacture of coke, refined petroleum products and nuclear fuel [23]	1.10 [145] (.905)	-	-	12.0%	12.2
Manufacture of chemicals and chemical products [24]	.882 [145] (.729)	4.88	6.67	14.7%	12.7
Manufacture of rubber and plastic products [25]	.955 [145] (.428)	3.64	5.66	5.91%	11.2
Manufacture of other non-metallic mineral products [26]	1.15 [145] (.849)	3.91	5.96	5.75%	10.7

Table B.1—Sample and Descriptive Statistics for Revealed Comparative Advantage (RCA), Alternative Measures of Industry Work Autonomy, and Different Measures of Industry Skill Intensity, *ctd*.

Industry (NACE code in square brackets)	RCA	Industry work autonomy (based on below-average work autonomy sample)	Industry work autonomy (based on above-average work autonomy sample)	High skill intensity (percentage high skilled workers)	General skill intensity (average years of education)
Manufacture of basic metals [27]	1.27 [145] (.897)	3.73	5.73	5.65%	10.9
Manufacture of machinery and equipment not elsewhere classified [29]	.819 [145] (.427)	3.99	6.66	9.17%	12.0
Manufacture of office machinery and computers [30]	.840 [145] (1.01)	-	6.68	20.9%	13.7
Manufacture of electrical machinery and apparatus not elsewhere classified [31]	.965 [145] (.550)	4.18	6.16	8.98%	11.7
Manufacture of radio, television and communication equipment and apparatus [32]	.908 [145] (.816)	4.17	6.44	11.9%	12.8
Manufacture of medical, precision and optical instruments, watches and clocks [33]	.775 [145] (.714)	5.08	7.15	14.0%	12.9

Table B.1—Sample and Descriptive Statistics for Revealed Comparative Advantage (RCA), Alternative Measures of Industry Work Autonomy, and Different Measures of Industry Skill Intensity, *ctd*.

Industry (NACE code in square brackets)	RCA	Industry work autonomy (based on below-average work autonomy sample)	Industry work autonomy (based on above-average work autonomy sample)	High skill intensity (percentage high skilled workers)	General skill intensity (average years of education)
Manufacture of motor vehicles, trailers and semi-trailers [34]	.820 [145] (.567)	4.06	5.93	8.30%	11.9
Manufacture of other transport equipment [35]	.707 [145] (.600)	4.76	6.51	8.97%	11.9
Other business activities [74]	.563 [116] (.854)	5.91	7.02	18.5%	13.6
Whole sample	1.16 [3364] (1.77)	4.39 [21] (.711)	6.19 [21] (.810)	8.19% [24] (5.16%)	11.2 [24] 1.48

Notes. Standard deviations in parentheses. Number of observations in square brackets. The construction of the two alternative measures of industry work autonomy, one based on individual-level data from countries that have mean levels of mean work autonomy below the sample average and one based on individual-level data from countries that have mean levels of mean work autonomy above the sample average, is described in the main text. Following the results of the reliability analysis (Section II and Table 3 in the main text), I only consider alternative industry work autonomy scores based on responses from at least 100 individuals. This criterion results in missing industry work autonomy scores for some industries in the analysis. For RCA, fewer than 145 observations (5 years x 29 countries)

indicates that an RCA score is missing for this industry for at least one country in at least one year. As mentioned in the main text, I construct the two measures of industry skill intensity in the same way as the industry work autonomy measure, meaning that I aggregate individual-level data from the ESS (first four waves / years 2002-2008) at the industry level. Although they have the same survey as their source, the data for these two measures is rather different. High skill intensity is measured as the percentage of people employed in an industry with an educational classification of at least some tertiary education (ISCED V1 or higher). The ISCED measure of a respondent's education level is constructed by the ESS project team by recording the highest degree that a respondent has obtained, which is country-specific, and then harmonizing the recorded degree to fit the cross-country ISCED classification. General skill intensity, in contrast, is measured using respondents' answer to the survey item that asks them how many years of education they have. See Panel c of Table A.1 for more information on the education data in the ESS. The measure of high skill intensity is the main measure that I use in my empirical analyses, using the general skill intensity measure in a robustness check. Following the procedure for industry work autonomy, I have checked that industry skill intensity scores are based on at least 100 individual observations.

Supplementing the industry-level data presented in Table B.1 above, Table B.2 below concerns data on country-level time-varying independent variables, for which I present summary statistics for each of the 29 countries in my sample.

Table B.2—Sample and Descriptive Statistics for Country-Level Time-Varying Independent Variables

Country	Human capital endowment (years of schooling)	Institutional quality (rule of law)
Australia	12.0 [5] (.055)	1.73 [5] (.026)
Austria	9.98 [5] (.540)	1.90 [5] (.058)

Table B.2—Sample and Descriptive Statistics for Country-Level Time-Varying Independent Variables, *ctd*.

Country	Human capital endowment (years of schooling)	Institutional quality (rule of law)
Belgium	10.5 [5] (.313)	1.27 [5] (.050)
Canada	12.1 [5] (.537)	1.74 [5] (.064)
Czech Republic	12.7 [5] (.462)	.794 [5] (.111)
Denmark	11.1 [5] (.321)	1.94 [5] (.081)
Finland	9.76 [5] (.873)	1.93 [5] (.029)
France	9.94 [5] (.391)	1.42 [5] (.023)
Germany	11.9 [5] (.760)	1.68 [5] (.056)
Greece	9.62 [5] (.576)	.801 [5] (.020)

Table B.2—Sample and Descriptive Statistics for Country-Level Time-Varying Independent Variables, *ctd*.

Country	Human capital endowment (years of schooling)	Institutional quality (rule of law)
Hungary	11.5 [5] (.152)	.856 [5] (.030)
Iceland	9.90 [5] (.354)	1.88 [5] (.065)
Ireland	11.4 [5] (.122)	1.67 [5] (.119)
Italy	9.44 [5] (.602)	.452 [5] (.208)
Japan	11.2 [5] (.270)	1.31 [5] (.046)
South Korea	11.1 [5] (.311)	.896 [5] (.086)
Mexico	7.90 [5] (.316)	-.511 [5] (.121)
Netherlands	11.1 [5] (.224)	1.75 [5] (.019)

Table B.2—Sample and Descriptive Statistics for Country-Level Time-Varying Independent Variables, *ctd*.

Country	Human capital endowment (years of schooling)	Institutional quality (rule of law)
New Zealand	12.2 [5] (.152)	1.82 [5] (.041)
Norway	12.5 [5] (.537)	1.92 [5] (.068)
Poland	9.70 [5] (.122)	.469 [5] (.118)
Portugal	7.24 [5] (.270)	1.08 [5] (.100)
Slovakia	11.5 [5] (.179)	.466 [5] (.106)
Spain	9.74 [5] (.391)	1.15 [5] (.136)
Sweden	11.6 [5] (.313)	1.84 [5] (.064)
Switzerland	10.7 [5] (.239)	1.86 [5] (.056)

Table B.2—Sample and Descriptive Statistics for Country-Level Time-Varying Independent Variables, *ctd*.

Country	Human capital endowment (years of schooling)	Institutional quality (rule of law)
Turkey	6.04 [5] (.313)	.031 [5] (.082)
UK	9.02 [5] (.249)	1.66 [5] (.078)
US	13.2 [5] (.089)	1.58 [5] (.044)

Notes. Standard deviations in parentheses. Number of observations in square brackets. The measure of institutional quality is the rule of law index from the World Bank Worldwide Governance Indicators project (World Bank 2013).

APPENDIX C: TRUST INDICATORS AND THEIR CONSTRUCTION

Table C.1 below reports country scores on the different trust indicators that I use in the empirical analysis. I have one main indicator and four indicators designed specifically to enable causal identification of the effect of trust on industry specialization. The main trust indicator (first column) is based on all available data from the World Values Survey or WVS. As discussed in the main text, for the historical trust indicators, I have limited the WVS data from which to calculate country trust scores to individual responses collected before the year mentioned, either before 2000 or before 1995. For most countries, limiting the sample to responses collected at a date further in the past reduces the number of individual responses on which the measure of social trust is based, but this need not always be the case.

Table C.1—Country Trust Levels for Different Measures of Trust

			Historical trust				Cultural component of trust	
Country	Trust		Pre-2000 trust		Pre-1995 trust		Trust of first-generation migrants	Trust of second-generation migrants
Australia	44.6%	[4617]	43.1%	[3214]	48.2%	[1189]	.098	.891
Austria	32.7%	[2716]	32.7%	[2716]	31.8%	[1301]	.027	.149
Belgium	31.3%	[5401]	31.3%	[5401]	32.3%	[3577]	.134	.182
Canada	44.5%	[6907]	51.1%	[2890]	51.1%	[2890]	.475	-.751
Czech Republic	26.7%	[5939]	26.7%	[5939]	27.4%	[2975]	-.063	-.135
Denmark	58.8%	[3037]	58.8%	[3037]	55.1%	[2051]	1.06	-.071
Finland	56.5%	[4525]	55.2%	[2510]	59.2%	[1541]	.625	-.388
France	21.9%	[4612]	22.8%	[3616]	23.9%	[2056]	-.131	.154
Germany	34.3%	[8684]	34.3%	[6786]	32.9%	[2893]	.115	.343
Greece	23.7%	[986]	23.7%	[986]	-		-.082	-.221
Hungary	26.9%	[3999]	26.9%	[3999]	29.9%	[2377]	.361	-.195
Iceland	41.3%	[2506]	41.3%	[2506]	41.4%	[1581]	.598	1.55

Table C.1—Country Trust Levels for Different Measures of Trust, *ctd*.

Country	Trust	Historical trust: Pre-2000 trust	Historical trust: Pre-1995 trust	Cultural component of trust: Trust of first-generation migrants	Cultural component of trust: Trust of second-generation migrants
Ireland	41.5% [3150]	41.5% [3150]	44.0% [2158]	.380	.799
Italy	31.7% [6133]	32.2% [5180]	31.9% [3234]	-.033	-.288
Japan	41.6% [5280]	41.8% [3000]	41.6% [2010]	1.05	-
South Korea	31.7% [5778]	33.8% [3394]	35.8% [2147]	.617	1.37
Mexico	24.1% [8432]	27.3% [5387]	24.5% [3156]	.607	-
Netherlands	50.6% [4030]	52.6% [3034]	48.9% [2037]	.414	.171
New Zealand	50.0% [2067]	49.1% [1162]	-	.427	-
Norway	66.4% [4250]	63.9% [3232]	63.2% [2114]	.838	.946
Poland	23.3% [4819]	24.2% [3864]	31.8% [1716]	-.010	.023
Portugal	17.4% [2124]	17.4% [2124]	21.7% [1149]	-.302	-.280
Slovakia	21.3% [3885]	21.3% [3885]	22.0% [1550]	.026	-.680
Spain	32.8% [10,690]	34.4% [8342]	34.6% [6044]	.015	-.284
Sweden	63.5% [4714]	62.3% [3751]	61.6% [1820]	.487	.287
Switzerland	43.8% [3181]	39.4% [1994]	42.6% [863]	.454	-.114
Turkey	11.3% [8790]	7.1% [2904]	10.0% [1012]	-.183	-.238
UK	35.9% [5622]	37.2% [4600]	43.4% [2567]	.313	-.043
US	41.2% [7981]	41.5% [6740]	45.2% [4041]	.296	.118
Country-level descriptives	36.9% [29] (13.9%)	37.1% [29] (13.8%)	38.4% [27] (13.2%)	.297 [29] .356	.127 [26] .570

Notes. Standard deviations in parentheses. Number of observations in square brackets.

In contrast to the trust indicators based on WVS data (first three columns in Table C.1), the final two trust

indicators are constructed especially as measures of the cultural component of trust that is stable and independent of economic and institutional influences. I construct these indicators using data from the ESS (Waves 1-5 / years 2002-2010). The ESS trust item is almost identical to the WVS trust item, asking respondents to answer the following question: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?," with answers ranging from 0, "You can't be too careful" to 10, "Most people can be trusted."

The approach to constructing these two measures is to regress individual trust scores on a set of independent variables. The most important independent variables are the dummy variables that represent the country of ancestry of first- or second-generation migrants, as I use the estimated coefficients for these dummies to measure the cultural component of trust. Other independent variables are added as control variables. The main control variables are dummies for the destination country of migrants, which capture variation in trust scores due to living in a particular economic and institutional environment. I further control for age (10 cohort dummies), sex, marital status, employment status, income category, religious denomination (Roman Catholic, Protestant, Eastern Orthodox, Other Christian denomination, Jewish, Islamic, Eastern religions, Other non-Christian religions), and year fixed effects. In case of first-generation migrants, I additionally control for the time the respondent has spent in the destination country (a set of dummies). The reason for controlling for time spent in the destination country is that these variables are thought to capture, to some extent at least, the strength of both remaining influences of the ancestry country's economic and institutional environment and of the novel influences of the destination country's economic and institutional environment on respondents' level of trust. As for the regression analysis reported on in Table A.2, when using categorical independent variables, I add a category for cases with missing data.

A key feature of the measurement of the cultural component of trust is the identification of first- and second-generation migrants and their ancestry countries. I identify first-generation migrants by respondents' answers to the item asking "Were you born in [country]?" and I limit the sample for the regression to individuals who answered negatively to this question. For these individuals I subsequently identify their country of ancestry by the answer to the item asking "In which country were you born?" The ESS data comprise a variety of countries in which such first-generation migrants were born, including—importantly—all countries in my analysis of industry specialization. I thus create 29 dummy variables for the country of ancestry of first-generation migrants, using all other possible countries of ancestry as the base category. The sample for the regression involving first-generation migrants comprises 20,958 individuals, 8056 of which have ancestry in one of the 29 countries in my main analysis.

In similar fashion, I identify second-generation migrants by respondents' answers to three survey items. I start by selecting respondents that answered positively to the item asking "Were you born in [country]?" The other two items ask "Was your father born in [country]?" and "Was your father born in [country]?" respectively. I classify a respondent as a second-generation migrant when their father, their mother, or both their parents were not born in the destination country, while the respondent was. I subsequently identify second-generation migrants' country of ancestry using the two items asking "In which country was your father born?" and "In which country was your mother born?" In principle, a respondent's father and mother can be born in different countries, in which case I select the country in which the respondent's mother was born as the ancestry country. Again, the ESS data comprise a variety of countries in which the parents of second-generation migrants were born. Compared to first-generation migrants, second-generation migrants are much rarer, however. The sample for the regression involving second-generation migrants therefore comprises 6242 individuals, 2083 of which have ancestry in any one of the 29 countries in my main analysis. In terms of country-of-ancestry dummies, I can include 26 such dummies, meaning that I have to drop three countries from the analysis. The base category for this set of dummies is again formed by all other possible countries of ancestry.

Table C.2 below presents selected regression results for the two models thus estimated, the first concerning first-generation migrants (Model C1) and the second concerning second-generation migrants (Model C2). Given the relatively low number of observations for Model C2 (2083), which are also not evenly distributed over the 26 countries of ancestry that are present in the sample, estimates can be imprecise. However, overall model fit, both of Model C2 and of Model C1, is comparable to model fit reported by Algan and Cahuc (2010) ($R^2 \approx .10$).

Table C.2—Selected Regression Results for the Construction of Measures of the Cultural Component of Trust

	Model for first-generation migrant trust C1	Model for second-generation migrant trust C2
Country-of-ancestry dummies	Yes	Yes
Country-of-destination dummies	Yes	Yes
Time spent in destination country	Yes	No
Sex [1 = male]	.028 (.035)	.093 (.064)
Religious denomination	Yes	Yes

Table C.2—Selected Regression Results for the Construction of Measures of the Cultural Component of Trust, *ctd*.

	Model for first-generation migrant trust C1	Model for second-generation migrant trust C2
Education	Yes	Yes
Income category	Yes	Yes
Age cohort [Base category = Age data missing]		
First decile	.294 (.235)	.026 (.362)
Second decile	.136 (.227)	-.266 (.356)
Third decile	.206 (.226)	-.007 (.356)
Fourth decile	.291 (.226)	.176 (.355)
Fifth decile	.399* (.227)	.180 (.355)
Sixth decile	.449** (.227)	.059 (.357)
Seventh decile	.449** (.228)	.077 (.359)
Eighth decile	.605*** (.230)	.262 (.367)
Ninth decile	.511** (.232)	.211 (.372)
Tenth decile	.663 (.234)	.440 (.377)
Employment status [Base category = Employment status data missing]		
Paid work	.168 (.182)	.458 (.308)
Education	.332* (.198)	.873*** (.325)
Unemployed, looking for job	-.117 (.195)	.328 (.335)
Unemployed, not looking for job	-.181 (.214)	.375 (.374)
Permanently sick or disabled	-.265 (.206)	-.340 (.362)
Retired	-.013 (.187)	.432 (.324)
Community or military service	.986*** (.373)	.909 (.595)
Housework, looking after children, others	.078 (.187)	.536* (.322)
Other	.169 (.230)	.534 (.384)

Table C.2—Selected Regression Results for the Construction of Measures of the Cultural Component of Trust, *ctd*.

	Model for first-generation migrant trust C1	Model for second-generation migrant trust C2
Marital status	Yes	Yes
No. of observations	20,958	6242
R^2 adjusted	.098	.106

Notes. The dependent variable is trust (0-10). The set of dummies indicating time spent in the destination country combines two items in the ESS that have been included in different waves. One item asks respondents how long ago they first came to live in the country (if applicable) and the other item asks respondents in what year they first came to live in the country (if applicable). The education dummies refer both to respondents' educational attainment according to the ISCED classification and to respondents' educational attainment in terms of years of education, where the latter is divided into seven quantiles, just as for Panel c of Table A.1. Including both sets of dummies ensures that I control for educational differences in the most comprehensive way possible, while retaining the largest possible sample. The set of dummies indicating income category also combines two items in the ESS that have been included in different waves, one coding income category on a 1-10 scale and one coding income category on a 1-12 scale. Standard errors are in parentheses.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

APPENDIX D: ROBUSTNESS CHECKS

As stated, this appendix presents detailed results for the additional models that I have estimated to check the robustness of the baseline results (Table 4 in the main text).

Table D.1—Sensitivity Analysis of the Relationship Between Trust and Comparative Advantage in High-/Low-Autonomy Industries

	Quantile regressions			Outliers removed
	25% (D1)	50% (D2)	75% (D3)	(-2SD,+2SD) (D4)
Trust interaction (a_iT_c)	1.02***	.710***	.818***	1.18***
	(.192)	(.217)	(.305)	(.241)
High skill intensity interaction (s_iH_{ct})	.187	.072	.065	.017
	(.426)	(.682)	(.276)	(.288)
Human capital work autonomy interaction (a_iH_{ct})	.594	.909	1.12***	.702*
	(.495)	(.880)	(.373)	(.380)
Human capital (H_{ct})	-.225	-.660	-.712***	-.448**
	(.257)	(.472)	(.264)	(.223)
Country fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of obs.	3384	3384	3384	3050
No. of country-industry combinations	696	696	696	646
No. of countries	29	29	29	29
R^2	.220	.213	.154	.249

Notes. The dependent variable is the natural logarithm of revealed comparative advantage of country c in industry i at time t (see Eq. 1). Standard errors (in parentheses) are clustered at the country-industry level. Coefficients are standardized beta coefficients.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table D.2—Robustness Check for Alternative Measures of Industry Work Autonomy, an Alternative Measure of Industry Skill Intensity, Different Samples, and Controlling for Institutional Quality

	Alternative industry work autonomy measure, below-average work autonomy sample		Alternative industry work autonomy measure, above-average work autonomy sample		Alternative measure of high skill intensity (s_i)	Larger sample	Quality of formal institutions (Q_{ct})
	(D5)	(D6)	(D7)	(D8)	(D9)	(D10)	(D11)
Trust interaction with industry autonomy measure based on below-average work autonomy sample (a_iT_c)	.989** (.420)	-	-	-	-	-	-
Trust interaction with industry autonomy measure based on above-average work autonomy sample (a_iT_c)	-	-	.837** (.344)	-	-	-	-
Trust interaction (a_iT_c)	-	1.03*** (.256)	-	.669*** (.218)	.966*** (.228)	1.35*** (.211)	.805*** (.309)
General skill intensity interaction (s_iH_{ct})	-	-	-	-	.511 (.496)	-	-
Institutional quality interaction (a_iQ_{ct})	-	-	-	-	-	-	.230 (.334)
Institutional quality (Q_{ct})	-	-	-	-	-	-	-.265 (.312)

Table D.2—Robustness Check for Alternative Measures of Industry Work Autonomy, an Alternative Measure of Industry Skill Intensity, Different Samples, and Controlling for Institutional Quality, *ctd*.

	Alternative industry work autonomy measure, below-average work autonomy sample		Alternative industry work autonomy measure, above-average work autonomy sample		Alternative measure of high skill intensity (s_i)	Larger sample	Quality of formal institutions
	(D5)	(D6)	(D7)	(D8)	(D9)	(D10)	(D11)
High skill intensity interaction (s_iH_{ct})	-.010 (.413)	.029 (.401)	.270 (.447)	.128 (.448)	-	-	.237 (.397)
Human capital work autonomy interaction (a_iH_{ct})	.807 (.577)	1.07* (.571)	1.06* (.585)	1.15** (.538)	.457 (.444)	-	.496 (.529)
Human capital (H_{ct})	-.447 (.332)	-.647* (.332)	-.735** (.328)	-.762*** (.296)	-.588** (.259)	-	-.287 (.304)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	2987	2987	2987	2987	3384	6670	3384
No. of country-industry combinations	609	609	609	609	696	696	696
No. of countries	29	29	29	29	29	29	29
R^2 adjusted	.234	.242	.305	.306	.242	.240	.241

Notes. The dependent variable is the natural logarithm of revealed comparative advantage of country c in industry i at time t (see Eq. 1). The industries that have been dropped differ for the two alternative measures of industry work autonomy (see Table B.2 in Appendix B). Standard errors (in parentheses) are clustered at the country-industry level and bootstrapped with 250 repetitions. Coefficients are standardized beta coefficients.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

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